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Refereed papers

Adoption and perception of electronic clinical communications in Scotland

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ABSTRACT

Objectives To determine the uptake of multiple eHealth facilities enabled by the NHS Scotland Electronic Clinical Communications Implementation Programme (ECCI) and to ascertain primary and secondary care users' perceptions.

Design Prospective monthly measurement of 37 indicators of roll-out and adoption. Retrospective questionnaire survey of users.

Setting Scottish health board regions. Quantitative implementation indicators were gathered in primary and secondary care across all 16 regions. Questionnaire data were obtained from recorded users in five representative regions (112 general practices, 92 secondary care units).

Outcome measures Change in uptake levels of ECCI facilities over a 15-month period. Users' perceptions of benefits, facilitators and barriers.

Results All health boards participated in the monthly data set collection. The response rate to the survey was 62% in primary care and 37% in secondary care. Across Scotland as a whole, the process of implementation was gradual. While there were marked gains in the availability of ECCI facilities over the observation period, rates of adoption lagged behind and varied across alternative facilities. Electronic results were widely used, with most laboratories offering them and around half of general practices receiving them. More modest rates of adoption were

observed for e-discharge letters, e-referrals, e-clinic letters and clinical email. E-booking was used very little. Among engaged users responding to the survey, electronic access to test results was the most frequently utilised facility and electronic outpatient booking the least. Perceived benefits of ECCI facilities included convenience, ease of use, time-saving and provision of an audit trail. Perceived barriers included the need to duplicate data entry where new systems were not universally implemented, technological difficulties, time, training and resources.

Conclusions Significant progress was observed in the implementation of ECCI facilities across Scotland. Users reported that these improved communication and were beneficial, but system reliability, incompatibility and duplication of data hindered more widespread uptake. Data were collected at a transitional phase of the programme. Whilst, among users of ECCI facilities, perceptions of the programme and its potential benefits were generally positive, its full impact will not become evident until the new electronic tools are implemented nationally and have been more fully integrated into normal work routines.

Keywords: electronic clinical communications, eHealth, information management and technology

Introduction

Paper-based methods of relaying and storing clinical information are subject to many problems, including postal delays, loss of records and variations in legibility. Harnessing technology to improve efficiency, safety and quality in the exchange of patient information is an objective of governments worldwide.^{1–3}

The Electronic Clinical Communications Implementation Programme (ECCI) was initiated in 2000 as part of the Scottish National Health Service (NHS) Information Management and Technology (IM&T) strategy.^{4,5} Its objective was to facilitate the implementation of interprofessional eHealth facilities throughout the NHS in Scotland, focusing on the following ‘deliverables’:

- electronic results reporting from secondary care laboratories to primary care
- electronic hospital outpatient appointment booking from primary care (with or without protocols)
- electronic transfer of hospital discharge and clinic letters to primary care
- electronic referral from primary to secondary care
- clinical email (such as second opinion correspondence).

As part of the wider IM&T strategy, ECCI has similarities to the current National Programme for IT (NPfIT) in England.⁶ However, its focus was implementation of the key deliverables rather than technology development *per se*. A programme to develop a common suite of ECCI tools – the Scottish Care Information Programme (SCI) – was initiated in parallel.⁷ For logistical reasons described elsewhere, the ECCI deliverables reported in this paper were achieved using a range of technologies in addition to those developed by SCI.^{8,9}

Despite their often considerable cost and their potential implications for the delivery of care, evaluation of healthcare IT initiatives remains poorly documented and commentators on the topic have observed a tendency for evaluation to be either neglected or done informally, often after a project has been implemented.¹⁰ The Scottish Executive Health Department commissioned an external evaluation shortly after the inception of the ECCI Programme, enabling early results to be used to inform strategy. The larger project, which is described elsewhere, incorporated a range of qualitative and quantitative methods and attempted to go beyond the typical description of system usage and user satisfaction and consider ‘non-technology’ issues that are not so easily quantified but present barriers to implementation.^{8,11} The findings reported in this paper demonstrate the uptake and use of individual ECCI facilities and illustrate users’ perceptions of

the benefits and drawbacks of the programme and barriers and facilitators to its implementation.

Methods

Setting

ECCI took place in all 16 Scottish health board regions. Roll-out was staged to reflect the readiness to proceed of each region and took place in three phases, beginning in autumn 2000. Descriptive data are reported for this national sample.

Five health boards, representing all roll-out phases and a range of geographic and socio-economic circumstances, were selected for in-depth study. The survey was distributed in these areas only and targeted general practices and secondary care sites (hospital clinics and wards) recorded as having used one or more ECCI systems, so as to gain informed views.

Indicators of implementation

A modified Delphi process was used to achieve consensus on a series of quantitative indicators for measuring the progress of the ECCI Programme.⁸ The final dataset contained 37 indicators of readiness to implement and saturation/use (Box 1). Data were collected from all 16 health board areas by regional ECCI teams and returned to the research team on a monthly basis between July 2002 and September 2003. In the majority of cases, data were collected via automated auditing facilities, minimising human error.

User survey

Representatives of primary and secondary care in the five study regions were sent a questionnaire in June 2003.^a The survey targeted informed stakeholders and included all general practices and secondary care sites (wards and clinics) in which at least one of four specific ECCI facilities had been implemented ($n=433$). It focused on electronic results reporting, discharge letters and referral letters, as they were the most frequently installed facilities across all health board regions, and on outpatient booking due to its high profile. The questionnaire was designed to be completed by a site representative in consultation with colleagues, thereby allowing exploration of the perceptions of ECCI in the whole practice or secondary care site. It sought information on the individual ECCI facilities used, frequency

^a The questionnaire can be seen at www.chs.med.ed.ac.uk/gp/downloads/ecci/usersurvey.pdf

Box 1 Monthly data set – indicators of use of ECCI

Indicator	Description
<i>Electronic Results Reporting</i>	
1	Disciplines offering electronic access to laboratory results
2	General practices with access to the electronic results reporting facility
3	General practices with staff trained to use electronic results reporting
4	General practices having used electronic results reporting
5	General practices receiving results directly into the practice system
<i>Electronic Immediate Discharge Letters</i>	
6	Wards able to generate electronic immediate discharge letters (IDLs)
7	Wards trained to generate electronic IDLs
8	Wards generating and sending electronic IDLs
9	Total number of electronic immediate IDLs generated and sent
10	General practices able to receive IDLs electronically
11	General practices receiving IDLs electronically
<i>Electronic Final Discharge Letters</i>	
12	Specialties able to generate electronic final discharge letters (FDLs)
13	Specialties trained to generate electronic FDLs
14	Specialties generating and sending electronic FDLs
15	Total number of electronic FDLs generated and sent
16	General practices able to receive FDLs electronically
17	General practices receiving FDLs electronically
<i>Electronic Clinic Letters</i>	
18	Specialties able to generate electronic clinic letters
19	Specialties trained to generate electronic clinic letters
20	Specialties generating and sending clinic letters electronically
21	Total number of electronic clinic letters sent
22	General practices able to receive clinic letters electronically
23	General practices receiving clinic letters electronically
<i>Electronic Referrals</i>	
24	General practices with access to the electronic referrals system
25	General practices with staff trained to use the electronic referrals system
26	Total number of referral letters electronically transmitted
<i>Electronic Outpatient Booking</i>	
27	General practices with access to electronic outpatient booking
28	General practices with staff trained to use electronic outpatient booking
29	General practices using electronic outpatient appointment booking systems
30	Consultant-led specialties accepting electronic outpatient appointments
31	Total number of outpatient appointments booked electronically
<i>Clinical Email</i>	
32	General practices with staff able to use clinical email in reporting period
33	General practices with a member of staff and/or GP trained to use clinical email
34	General practices using clinical email
35	Consultant-led departments able to use clinical email
36	Consultant-led departments trained formally to use clinical email
37	Consultant-led departments using clinical email

of use (daily, weekly, monthly, rarely, never) and perceptions of the benefits and drawbacks of the facilities and barriers and facilitators to implementation. Where possible, questionnaires were sent electronically. Non-responders were followed up with an electronic reminder. Subsequent non-responders were sent a questionnaire by post.

Results

Monthly dataset indicators were submitted by all health boards. Among recorded users of ECCI facilities in the five selected health board areas, completed questionnaires were returned by 112 of the 182 primary care sites (62%) and by 92 of the 251 secondary care sites (37%), an overall response rate of 47%.

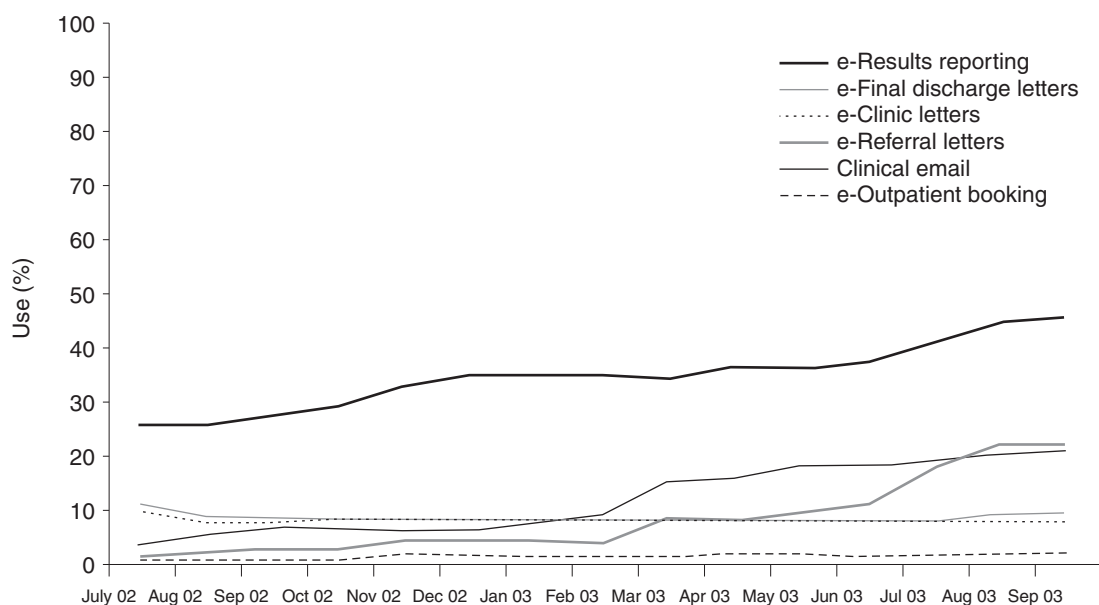
Use of ECCI facilities

All Scotland

Figures 1 and 2 illustrate the progress of ECCI implementation across Scotland between July 2002 and September 2003 (the evaluation period). As of the

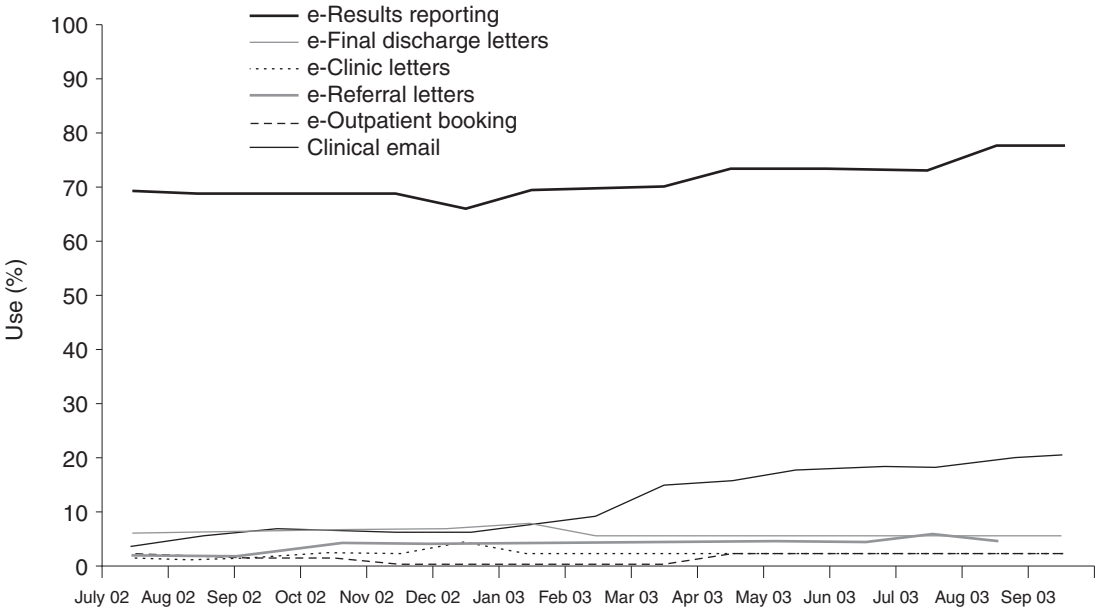
latter date, the picture was one of partial implementation, with usage lagging behind installation of systems and variation in uptake rates across alternative facilities. Most laboratories (79%) were offering electronic access to results, while around half of general practices had access to (46%) and were using (46%) this facility. Facilities for receiving electronic immediate (and final) discharge letters were available in 37% (33%) of practices but only 10% (15%) of hospital wards had the ability to generate them and only 10% (9%) of practices were receiving them. Electronic referral systems were in place in 51% of practices, but only 21% of referral letters were sent electronically. Electronic clinic letters could be produced by 11% of specialties and received by 41% of practices, but only 3% of specialties were actually sending them and only 8% of practices receiving them. Uptake of clinical email was also relatively low, with 22% of general practices and 5% of consultant-led departments using it. Outpatient appointment booking was the least used of the ECCI deliverables. Only 2% of consultant-led specialties accepted e-booking, and it was used by only 2% of practices. Of the 78 173 outpatient appointments made in September 2003, only 39 were booked electronically.

Whilst no single ECCI facility had been fully implemented by September 2003, progress had been made during the year, particularly in primary care. The largest change related to electronic referrals,



The above figures reflect the percentage of sites using electronic systems to action the targeted communications, except in the case of referrals, where they reflect the percentage of all letters sent electronically.

Figure 1 Percentage of all general practices actively using ECCI facilities between July 2002 and September 2003 (national minimum dataset – all 16 health board areas)



The above figures reflect the percentage of sites using electronic systems to action the targeted communications, except in the case of referrals, where they reflect the percentage of all letters sent electronically.

Figure 2 Percentage of all secondary care units (clinics, wards, laboratories) actively using ECCI facilities between July 2002 and September 2003 (national minimum dataset – all 16 health board areas)

which saw a 29% increase in the number of practices with access and a 17% increase in the number of letters sent. Likewise, the number of practices able to receive electronic discharge and clinic letters increased by 7% and 14%, respectively. Changes in secondary care were less marked. Despite a slight increase in the number of specialties able to generate electronic discharge and clinic letters, fewer practices actually received them. In addition, whilst the number of practices able to use electronic outpatient booking increased, the number of specialties accepting appointments reduced marginally. (A further breakdown of results from the minimum data set is available online.¹²⁾

Engaged sites using one or more deliverables

Among practices and clinics responding to the questionnaire, a more positive picture emerged. E-results reporting was the most frequently used facility, followed by e-referrals, e-discharge letters and e-booking (see Figure 3). The majority of general practices with access to electronic results, discharge letters or referral facilities stated that they used these daily (67%, 67%, 78%, respectively) and few reported never using them (6%, 2%, 7%). In contrast, only 7% of practices reported daily use of electronic outpatient booking, whilst more than two-thirds indicated that they did not use it at all. Less than a quarter of the practices responding

to the survey (20%) used all four facilities, with most using one (27%) or two (36%).

Self-reported use was generally lower in secondary care. As in primary care, results reporting facilities were most frequently employed, followed by those for producing discharge letters and for receiving referrals and outpatient bookings. (Receipt of electronic test results by hospital clinics was not within the official remit of ECCI; however, many hospitals had the facility to access their laboratory systems, and results indicate

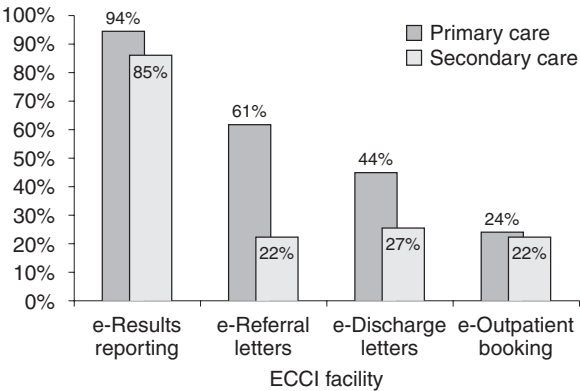


Figure 3 Proportions of engaged primary and secondary care sites actively using each ECCI facility (Self-report survey from 5 selected Health Board Areas, June 2003)

that this was perceived as part of ECCI.) The majority of sites with access to these facilities reported using them daily (81%, 88%, 50%, 75%, respectively) and only a few reported never using them (4%, 4%, 5%, 10%). Only 5% of secondary care respondents reported using all four facilities; again, most were using one (48%) or two (28%).

Perceptions of ECCI facilities among survey respondents

Electronic results reporting

Advantages of ECCI most frequently cited by primary care survey respondents related to electronic results reporting and included ease of use and the ability to access results shortly after a test has been carried out. It was felt that this would be particularly beneficial for rural practices subject to postal delays and, potentially, out-of-hours staff dealing with unfamiliar patients. However, incomplete availability of the service was an issue, with practices linked only to some specialties, and automatic downloading of results into patients' electronic health records (rather than simply browser access) was felt to be desirable. (The latter was a desired aim of the programme.)

Among secondary care respondents, the most frequently cited advantages were ease of use and immediate access to data on the ward. This facilitated review of results before ward visits and was said to enable more effective discharge planning. As in primary care, limited implementation at the time of the survey was an issue, with some wards and clinics not linked to the system and some categories of staff unable to gain access.

Electronic referral letters

The main perceived benefits related to speed of the referral process and provision of an audit trail. It was considered an efficient method of completing letters, since patient data were already in the general practice computer system and did not have to be re-entered. Nevertheless, it was acknowledged that improved process efficiency did not necessarily affect when the patient was seen. Some users stated that their referral program was insufficiently flexible. For example, if a letter was sent to a hospital that could not deal directly with it, it was returned to the practice and had to be re-sent elsewhere, potentially increasing waiting time for the patient. The inability to attach documents, such as patient summaries, was also perceived as a problem. In addition, the asynchronous nature of the method precluded its use for urgent referrals. Like all technological innovations, ECCI facilities were susceptible to

system failure, which could result in the loss of an incomplete document. In secondary care, it was perceived that electronic referral could lead to reduced waiting times through more appropriate protocol-based referrals and thus reduce unnecessary hospital attendance.

Electronic discharge letters

Use of electronic discharge letters was considered to improve data quality and thus patient care by providing general practitioners (GPs) with legible, detailed information, in some cases before the patient had even left hospital. This was considered to have facilitated a rapid, informed discharge for the patient and provided a timely, accurate summary and prescription list for the GP. Patients could receive the correct drugs immediately on leaving hospital and home visits could be arranged. However, lack of universal uptake was perceived as problematic. Not all hospital wards and general practices were able to submit or receive electronic discharge letters, respectively, thus both paper and manual systems often had to be maintained and ward staff had to decide on the appropriate communications medium for individual cases.

Electronic outpatient booking

Users reported that outpatient booking was time-consuming and of limited use, since it was thought to be impractical in a primary care setting and too slow to be used during a consultation. Indeed, it was perceived by some respondents to be easier to contact the local consultant by telephone if an urgent booking was required. However, it was believed to have reduced the 'did not attend' rate for some outpatient clinics.

Perceptions of the ECCI programme overall

ECCI was considered to have improved communication and information sharing and to have reduced paperwork and processing. It was also thought to facilitate patient care and clinical decision making by increasing clarity in patient records. The main perceived barrier to use was the incompatibility and instability of computer systems at a transitional time for computer network developments in NHS Scotland. Practices using clinical systems other than the national system, General Practice Administration for Scotland (GPASS), were not always able to participate in data exchange, and some secondary care sites could not access certain types of files sent from primary care. Duplication of data was frequently mentioned, with both electronic

and paper records often being required. Some respondents believed that ECCI increased demands on practitioners' time, taking them away from clinics and patient contacts. Other barriers, cited by both primary and secondary care users, were lack of resources, IT skills and dedicated time for training.

Discussion

Minimum dataset returns for all 16 health boards demonstrate that significant progress had been made in the implementation, availability and use of electronic clinical communications in the NHS in Scotland during the timescale of the evaluation, and most targeted deliverables were on the increase. Measurement is ongoing and more recent data from this exercise are now available in the public domain.¹² These illustrate ongoing gains. For example, between September 2003 and November 2004, the proportion of GP practices using the highly valued electronic results reporting systems had risen from 46% to 99% and the proportion of referral letters electronically transmitted from 21% to 37%.

Few published studies have documented the adoption of comparable electronic clinical communications tools internationally, although a recent survey suggests that just over half of United States (US) physicians are accessing their patients' test results electronically while only a quarter use related facilities such as electronic ordering of tests and procedures.¹³

The national data presented here disguise regional variations in the progress of implementation. The health boards had widely divergent baselines in terms of IM&T infrastructure and culture, as well as different strategic priorities. As described elsewhere, such factors influenced sites' readiness to change, the relative prioritisation of deliverables and the speed of roll-out.⁹

The survey targeted engaged practices and secondary care sites since it sought informed views on the benefits and drawbacks of ECCI. Its results must therefore be interpreted with this in mind. The response rate from primary care (62%) is comparable with recent United Kingdom (UK) and international surveys of clinicians' computer usage.^{11,14,15} However, only one in three secondary care sites responded; this possibly reflects the lower level of computerisation and ECCI awareness among this sample.

Results indicated that ECCI users can see the theoretical advantages as well as perceiving some tangible benefits, but they also highlighted technical, human and organisational barriers that need to be overcome in order to ensure widespread implementation; they also drew attention to the comparative value of existing methods of communication, such as

the telephone, which contributes to the slow adoption of new innovations.

Over their lifespan, IM&T programmes will tend to move through stages such as scoping, systems design, infrastructure establishment, awareness raising and stakeholder engagement, process redesign, user training, testing in practice, and only later to widespread roll-out and uptake. The results presented here reflect the timescale of the evaluation project in relation to the lifespan of ECCI and the wider national strategy, and should not be read as a definitive account of its outcomes. ECCI has chiefly been about changing ways of working and its impact on clinical care and patient outcomes is unlikely to become apparent for some considerable time. The programme was highly complex, as were the challenges for implementation, and these results show only a part of the picture. For example, they do not convey the important contribution of the ECCI initiative to raising general IM&T capability across the NHS in Scotland.

The difficulties faced by ECCI are common in health informatics implementation, and while each context presents its own unique challenges, similar barriers have been described internationally for results reporting, electronic booking and related technologies such as electronic health records.^{13,16,17} Innovations such as ECCI require cultural as well as technological change.¹⁸ Involving users in the early stages and maintaining their involvement as the initiative develops can aid this process.^{19–21}

This study demonstrates that significant change had already been achieved in the attitudes and behaviour of end-users with respect to electronic clinical communications by November 2003, and the observed upwards trend is supported by more recent statistics. Although the original funding period for the ECCI programme ended in 2004, it continues to form part of the wider NHS Scotland eHealth Strategy.²² When forecasting completion dates and outcomes, policy makers and planners of comparable programmes should recognise that system availability is only one aspect of implementation; it is essential to allow time for the necessary technical, human and organisational changes to take place.²³

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CONFLICTS OF INTEREST

None.

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